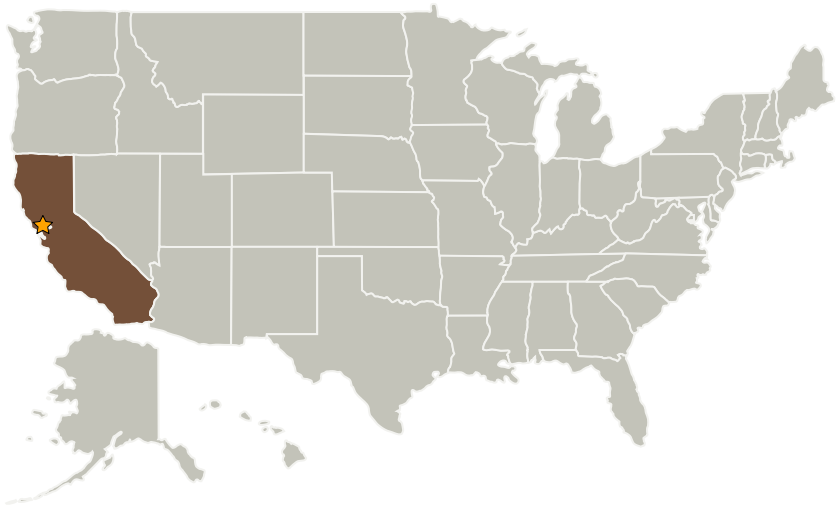
# Hybrid LIBS and Raman Spectroscopy Standoff Detection System, Phase I

Completed Technology Project (2006 - 2006)

## Project Introduction

To address the NASA need for robotic platform-mounted instruments that can chemically analyze extraterrestrial surfaces, Physical Optics Corporation (POC) proposes to develop a new integrated standoff Laser Induced Breakdown Spectroscopy (LIBS) and Raman Spectroscopic (LIBRA) system to perform rapid material analysis from a distance of >20 m. Dual LIBS and Raman measurements ensure high specificity in chemical analysis. While LIBS identifies trace elements, Raman spectroscopy enables the robotic rover to distinguish complex materials such as hydrous and anhydrous gypsum that indicate the presence of water on a planet. This system features embedded chemical fingerprinting software for real-time analysis of material signatures, and has a software interface to NASA robotic platforms. Through POC's compact excitation laser and high-resolution spectral detection subassemblies, LIBRA has unprecedented specificity of material identification in an energy efficient (<10 W), compact (<0.03 cubic meter volume), light (<2 kg) hermetically sealed package that is ruggedized (no moving parts) and optimized for robotic exploration. In Phase I, POC will demonstrate LIBRA system feasibility by assembling and testing a proof-of-concept laboratory prototype, and investigate issues of space qualification. In Phase II a fully functional prototype system will be developed and its standoff detection capability from robotic platforms will be demonstrated.

## Primary U.S. Work Locations and Key Partners

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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Ames Research Center (ARC)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

**Small Business Innovation Research/Small Business Tech Transfer**

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Ames Research Center(ARC) | Lead Organization | NASA Center | Moffett Field, California |
| Physical Optics Corporation | Supporting Organization | Industry | Torrance, California |

| Primary U.S. Work Locations |
|---|
| California |

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.2 Atomic and Molecular Species Assessment